Attorney Docket Ref.: 41051.P012X
Client Ref: GW10.071c

APPLICATION FOR UNITED STATES LETTERS PATENT

FOR

A Wireless Mobile Phone Having Encoded Data Entry Facilities

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"Express Mail" label number: EL910784775US
Deposit Date: October 10, 2001

A Wireless Mobile Phone Having Encoded Data Entry Facilities

Related Application

The present application is a continuation-in-part application to U.S. Application number 09/767,587, entitled "A Wireless Mobile Phone With Morse Code and Related Capabilities", and filed on January 22, 2001

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to the field of wireless mobile phones. More specifically, the present invention relates to complementary features that enhance the usability of wireless mobile phones.

2. Background Information

Advances in integrated circuit and telecommunication technology have led to the development and wide spread adoption of wireless mobile client devices, in particular, wireless mobile telephones. Wireless mobile phones offer the advantage of enabling their users to be communicatively reachable by their business associates, friends and family members, wherever the users may be, as long as they are within the reach of the service networks. Thus, even non-professionals are increasingly dependent on their wireless mobile phones to meet their communication needs.

With increased usage and reliance, often times, wireless mobile phone users would find themselves in the dilemma of having to engage in potentially sensitive

conversations in a setting that is less than desirable, privacy-wise. For examples, a user may find himself/herself having to engage in an urgent personal or business conversation at a bus stop while waiting for the next bus, or at an airport terminal while waiting to board his/her flight. Under the prior art, a user may have to elect to continue the private/sensitive conversation in a less than private manner, switch to another form of communication, such as email, or delay the communication. Each of these options has disadvantages. Electing to proceed with the conversation in a less than private manner may unduly expose private/sensitive information to the public. Switching communication form is inconvenient. That is true even if the user is in possession of a wireless mobile phone capable of sending and receiving emails. The reason being, any switching would likely at a minimum, disrupts the continuity of the communication.

Therefore, a more user-friendly approach to accommodating privacy sensitive communication is desired. As will be described in detail bellow, the present invention provides a data entry method that improves the ease of data entry in general, and the ease of conducting privacy sensitive communication in particular.

Note: The term "wireless mobile phone" as used in herein (in the specification and in the claims) refers to the class of telephone devices equipped to enable a user to make and receive calls wirelessly, notwithstanding the user's movement, as long as the user is within the communication reach of a service or base station. The term "wireless mobile phone" is to include the analog subclass as well as the digital subclass (of all signaling protocols).

SUMMARY OF THE INVENTION

A wireless mobile phone is provided with one or more extra buttons (in addition to the standard input keypad) and complementary logic to facilitate entry of alphanumeric data via entry of their variable length encoded representations.

In one embodiment, the variable length encoded representations are Morse codes comprising combinations of "dit" and "dah" encoding. In another embodiment, the variable length encoded representations are custom designed codes comprising modified as well as newly formed "dit" and "dah" encoding combinations. In yet other embodiments, multiple variable length encoding schemes are supported with one of the supported encoding schemes selectable to be the operational encoding scheme.

In one embodiment, only one button is provided, with the "dit" and "dah" encoding being differentiated based on the duration the button is depressed. In another embodiment, two buttons are provided, one for the "dit" encoding, and the other for the "dah" encoding. In yet another embodiment, a third button is provided to facilitate quick entry of a frequently used encoding, e.g. the encoding for a "space".

In one application, the entered alphanumeric data form part of a textual message to be transmitted. As a result, a user may more naturally use the provided facilities to engage in non-verbal communication for sensitive subject matters in the middle of a call. In another application, the entered alphanumeric data form part of an address book entry.

In one embodiment, the complementary logic further facilitates echoing on a local display, alphanumeric data corresponding to the entered encoded representations.

Additionally, in various embodiments, each of the code entry buttons includes one or more light emitting diodes (LEDs), and the LEDs are lit to visually echo the encoded representations of letters, numbers and punctuations entered through the standard input keypad, in accordance with the selected operational encoding scheme.

Further, in one embodiment, the wireless mobile phone includes an adapter interface designed to be able to have a device capable of vibrating removably attached to the wireless mobile phone to facilitate the complementary logic to vibrationally output a text message received, through vibrational manifestation of the text message in encoded representations per the selected operational encoding scheme.

Note: The term alphanumeric data as used in the present application, including the claims, include letters, numbers, punctuations, symbols, and/or words/phrases formed with letters, numbers, punctuations and/or symbols.

BRIEF DESCRIPTION OF DRAWINGS

The present invention will be described by way of exemplary embodiments, but not limitations, illustrated in the accompanying drawings in which like references denote similar elements, and in which:

Figures 1a-1b illustrate a wireless mobile phone of the present invention, incorporated with encoded data entry facilities in accordance with the present invention, in accordance with two embodiments;

Figures 2a-2b illustrate the operational flow of the relevant aspects of the supporting logic provided to the wireless mobile phone of **Figs. 1a/1b**, in accordance with one embodiment; and

Figure 3 illustrates an internal component view of the wireless mobile phone of **Fig. 1a/1b**, in accordance with one embodiment.

DETAILED DESCRIPTION OF THE INVENTION

In the following description, various aspects of the present invention will be described. For purposes of explanation, specific numbers, materials and configurations are set forth in order to provide a thorough understanding of the present invention. However, the present invention may be practiced with only some of the described aspects, and without the specific details. In other instances, well-known features are omitted or simplified in order not to obscure the present invention.

The phrase "in one embodiment" will be used repeatedly, however the phrase does not necessarily refer to the same embodiment, although it may. Further, the terms "comprising", "having", "including" and the like are synonymous.

Referring now to **Figures 1a-1b**, wherein two embodiments of a wireless mobile phone **100** and **100'**, incorporated with the teachings of the present invention are shown. As illustrated, in accordance with the present invention, wireless mobile phone **100/100'** is provided with two extra buttons **120** and complementary logic (shown as ref. **330** in **Fig. 3**) to facilitate a user of phone **100/100'** to enter alphanumeric data, e.g. data that are part of a text message to be transmitted or data to be stored into an address book inside phone **100/100'**. More specifically, buttons **120** in conjunction with the complementary logic facilitate a user in entering alphanumeric data through entry of their variable length encoded representations of an operational encoding scheme. Thereafter, the user may cause the entered alphanumeric data (internally represented in e.g. ASCII or other fixed length binary representations) to be sent and/or stored. [ASCII = American Standard Coding for Information Interchange.]

For the illustrated embodiment, one of buttons **120** is provided to allow a user to enter a first basis code, while the other is provided to allow the user to enter a second basis code (the "dit" and "dah" representations, in Morse terminology). The "dit" and "dah" representations entered are interpreted in accordance with the selected operational encoding scheme. In one embodiment, the encoding scheme may be a selected one of a custom encoding scheme (Tables I-IV) or the Morse codes (Tables V-VII). Note that the example custom codes reserve the two shortest code "dit" and "dah" for two user programmable words or phrases, such as yes/no, morning/evening, sweetie/jerk. Entry of the user preferred words or phrases for the two shortest codes may be facilitated in like manners as other system preferences. Further, example custom codes remapped some of the Morse codes, as well as introduced other new codes in anticipation of certain usage characteristics by a particular type of user populations. Custom codes that are different from the Morse codes are shown in italics in Table I-IV. In like manner, selection of either the example custom codes or the Morse codes as the operational codes may be facilitated as other operational preferences. In alternate embodiments, more than two encoding schemes may be supported.

The above described encoded data entry facilities may be employed in particular during a call, thereby enabling the user to conduct all or a portion of a call in a non-audible and more private manner. The encoded data entry may also be employed to improve entering data to be stored into a database or a file of phone **100/100'**, such as an address book.

Special Words/Phrases	Custom Codes
Programmable word/phrase one, e.g. Yes, Morning, Sweet	*dit*
Programmable word/phrase two, e.g. No, Evening, Jerk	*dah*

Table I – Custom Codes for Special Words/Phrases

Letters	Custom Codes
A	ditdah
B	dahditditdit
C	dahditdahdit
D	dahditdit
E	*ditdit*
F	ditditdahdit
G	*dahdahdahdit*
H	*dahditdah*
I	*ditdahdah*
J	ditdahdahdah
K	*ditdahditdit*
L	*dahdahdit*
M	*dahdahdahdah*
N	dahdit
O	dahdahdah
P	ditdahdahdit

Q	dahdahditdah
R	ditdahdit
S	ditditdit
T	*dahdah*
U	ditditdah
V	ditditditdah
W	*ditditdahdah*
X	dahditditdah
Y	dahditdahdah
Z	dahdahditdit

Table II – Custom Codes for Letters

Numbers	Custom Code
0	dahdahdahdahdah
1	ditdahdahdahdah
2	ditditdahdahdah
3	ditditditdahdah
4	ditditditditdah
5	ditditditditdit
6	dahditditditdit
7	dahdahditditdit
8	dahdahdahditdit
9	dahdahdahdahdit

Table III – Custom Code for Numbers

Punctuations	Custom Codes
/ (slash)	*dahditdahditdah*
, (comma)	*dahdahditditdah*
. (period)	*dahdahdahditdah*
? (question mark)	*ditdahditdah*
: (colon)	*ditdahdahditdah*
; (semicolon)	*ditdahditditdah*
! (exclamation)	*ditdahditdahdit*
((left parenthesis)	*ditditdahditdit*
) (right parenthesis)	*dahdahditdahdah*
space	*ditditditdit*
‘ (single quote)	*dahditdahdahdah*
“ (double quote)	*ditdahditdahdah*
- (hyphen)	*ditdahdahdahdit*
+ (plus sign)	*dahditditditdah*
= (equal sign)	*ditditdahdahdit*

Table IV – Custom Codes for Punctuations

Letters	Morse Code
A	ditdah
B	dahditditdit
C	dahditdahdit
D	dahditdit
E	dit
F	ditditdahdit

G	dahdahdit
H	ditditditdit
I	ditdit
J	ditdahdahdah
K	dahditdah
L	ditdahditdit
M	dahdah
N	dahdit
O	dahdahdah
P	ditdahdahdit
Q	dahdahditdah
R	ditdahdit
S	ditditdit
T	dah
U	ditditdah
V	ditditditdah
W	ditdahdah
X	dahditditdah
Y	dahditdahdah
Z	dahdahditdit

Table V – Morse Codes for Letters

Numbers	Morse Code
0	dahdahdahdahdah
1	ditdahdahdahdah

2	ditditdahdahdah
3	ditditditdahdah
4	ditditditditdah
5	ditditditditdit
6	dahditditditdit
7	dahdahditditdit
8	dahdahdahditdit
9	dahdahdahdahdit

Table VI – Morse Code for Numbers

Punctuations	Morse Codes
/ (slash)	dahditditdahdit
, (comma)	dahdahditditdahdah
. (period)	ditdahditdahditdah
? (question mark)	ditditdahdahditdit

Table VII – Morse Codes for Punctuations

In one embodiment, the conventional operational setting selection feature of phone **100/100'** is enhanced to facilitate a user in selecting an operational rate for processing and interpreting the encoded representations, e.g. 5 wpm, 13wpm, 20 wpm and so forth. The different operational rates facilitate usage by users of varying skill levels, from the novice users to the more advanced users.

Preferably, buttons **120** are strategically placed on a side surface of phone **100/100'** to facilitate single-handed operation of phone **100/100'**. That is, with the

side surface placement of buttons **120**, a user may e.g. use two fingers of the same hand holding phone **100/100'** to manipulate buttons **120** to enter alphanumeric data of a text message to be transmitted by entering their variable length encoded representations of the selected operational encoding scheme. Thus a user may be holding phone **100/100'**, engage in a verbal conversation, and switch to sending the other calling party a non-verbal text message, and then switch back to verbal conversation, all performed without changing the position of phone **100/100'** or altering the manner phone **100/100'** is held. Phone **100/100'** may be held next to the user's ear or in any arbitrary position if an earpiece or a speaker is used.

For the illustrated embodiments, which are designed for right-handed users, buttons **120** are strategically placed on left side surface **119a** of body casing **116** of phone **100/100'**. In alternate embodiments, designed for left-handed users, buttons **120** may be strategically placed on right side surface **119b** of body casing **116** of phone **100/100'** instead. In yet other alternate embodiments, buttons **120** may be placed on the top surface at top end **118a**.

Beside side surfaces **119a** and **119b**, and top end **118a**, body casing **116** also has bottom end **118b** as well as front surface **117/117'**. Note that side surfaces **119a** and **119b**, top and bottom ends **118a** and **118b**, and front surface **117/117'** are all objectively determined. As illustrated, wireless mobile phone **100/100'** also includes display **108/108'** for displaying data, including the data corresponding to the variable length encoded representations entered using buttons **102**. Accordingly, phone **100/100'** necessarily has a reading orientation. By definition, the surface the display is disposed is the front surface. The front surface in turn definitively defines the left side surface and the right side surface.

Further, such a device necessarily has a display orientation, which definitively defines top and bottom ends **118a** and **118b**. For example, textual data are either

rendered from left to right and top to bottom, as denoted by arrows **140a** and **140b**, as in the case of the English language, or right to left and top to bottom, as denoted by arrows **142a** and **142b** , as in the case of the Hebrew language, or top to bottom and right to left, as denoted by arrows **142b** and **142a**, as in the case of the Chinese language. Thus the manner in which textual data are rendered definitively defines which end is the top end, and which end is the bottom end. Moreover, an element A of phone **100/100'** will necessarily be considered as above element B of phone **100/100'**, and element B will necessarily be considered as below or beneath element A, if element A is closer to the objectively determinable top end of phone **100/100'** (or element B is closer to the objectively determinable bottom end of phone **100/100'**).

In various alternate embodiments, in lieu of the employment of two buttons, one single button may be employed instead. For these embodiments, the "dit" and "dah" codes may e.g. be differentiated based on the duration the single button is pressed.

In yet other alternate embodiments, in addition to the single or double "dit" and "dah" buttons provided, at least another second or third button may be provided to facilitate quick entry of a frequently used encoding. In one such alternate embodiment, a second/third button is provide to facilitate a quick entry of the encoding corresponding to a "space" (*dahditdahdah* for the earlier described custom encoding scheme). Preferably, the "frequently" used encoding may be assigned by the user (like other system preferences).

In yet other alternate embodiments, each "extra" button may be associated with more than one "frequently" used encoding, differentiated e.g. based on the duration the "extra" button is depressed. Further, multiple ones of these "extra"

buttons may also be provided. Again, preferably, the "frequently" used encoding may be assigned by the user (like other system preferences).

Continuing to refer to **Figs. 1a-1b**, beside buttons **120** and the complementary logic, phone **100/100'** is otherwise intended to represent a broad range of wireless mobile phones, including both the analog as well as the digital types (of all signaling protocols). In addition to buttons **120**, the complementary logic, body casing **116/116'** and display **108/108'** phone **100/100'** further includes standard input key pad **102/102'** having a number of conventional alphanumeric keys, "talk" and "end talk" buttons **104**, cursor control buttons **106**, antenna **110/110'**, ear speaker **112**, microphone **214** and adapter interface **122**.

The two embodiments differ in the relative disposition of antenna **110/110'** to ear speaker **112**, and the relative disposition of keypad **102/102'** to display **108/108'**. In the first embodiment, similar to conventional prior art wireless mobile phones, antenna **110** and ear speaker **112** are both disposed near top end **118a**, whereas in the second embodiment, unlike conventional prior art wireless mobile phones, antenna **110'** is disposed near bottom end **118b** while ear speaker **112** is disposed near top end **118a**. Further, in the first embodiment, similar to conventional prior art wireless mobile phones, keypad **102** is disposed in the lower half of phone **100** beneath display **108**, whereas in the second embodiment, unlike conventional prior art wireless mobile phones, keypad **102'** is disposed in the upper half of phone **100'** above display **108'**. In other words, except for code buttons **120** and the associated complementary logic of the present invention, the first embodiment represents a wide range of wireless mobile phones known in the art. Similarly, except for code buttons **120** and the associated complementary logic of the present invention, the second embodiment is disclosed in co pending application

number 09/767,526 filed January 22, 2001, entitled "A Wireless Mobile Phone with Inverted Placement of Antenna and Keypad", which is hereby fully incorporated by reference.

Further, for the illustrated embodiments, each of buttons **120** includes light emitting diodes (LED). The LEDs are employed by the complementary logic to visually echo the variable length encoded representations of the selected operational encoding scheme of letters, numbers and punctuations entered through input keypad **102/102'**, thereby facilitating a user in learning the more complex encoded representations of the selected operational encoding scheme. In a presently preferred embodiment, the corresponding variable length encoded representations are echoed responsive while the letters, numbers and punctuations are entered via input keypad **102/102'**. In various embodiments, the present invention also contemplates the conventional operational setting feature of phone **100/100'** will further be enhanced to facilitate enabling/disabling of this "learn mode".

Additionally, as alluded to earlier, phone **100/100'** includes adapter interface **122** for removably attaching a variety of accessory devices to phone **100/100'**. Among these removably attachable accessory devices include e.g. ear piece (not shown), and vibration device **132**. Thus, with the attachment of vibration device **132**, the complementary logic may vibrationally output received alphanumeric data through vibrational manifestations of their corresponding variable length encoded representations in accordance with the selected operational encoding scheme. As a result, a user may silently and vibrationally receive a text message.

In one embodiments, the encoded representations of the corresponding letters, numbers and punctuations are vibrationally manifested. In other embodiments, where the user has associated one or more words/phrases to one or more of the encoded representations, the complementary logic delays the

vibrationally manifestation by the length of the longest assigned word/phrase, to allow determination and potential output of the encoded representations of the assigned words/phrases

Referring now to **Figures 2a-2b**, wherein the operational flow (**200**) of the relevant aspects of the complementary logic is shown. As illustrated, during operation, the complementary logic continuously checks and determines the operational state of phone **100/100'**, and acts accordingly. For the illustrated embodiment, the complementary logic first checks to determine if an input has been entered using one of the code buttons **120**, block **202**. If an input has been entered, the complementary logic accumulates the code input received (until a letter, a number or a punctuation has been inputted, per the selected operational encoding scheme), using e.g. an accumulation buffer, block **204**.

Back at block **202**, if it is determined that an encoded representation has not been just inputted, the complementary logic determines if the operational state is considered to be at a pause after a series of successive code inputs have been entered, block **206**. If it is determined that the operational state is at such a pause, the complementary logic maps the accumulated code entered to its corresponding alphanumeric data, and causes the corresponding alphanumeric data (in e.g. its ASCII form) to be injected into the data stream of a current application, block **208**. As alluded to earlier, the current application may be a messaging application, i.e. the data stream is a message being formed for transmission. Alternatively, the current application may be an address book application, i.e. the data stream is an address book record to be stored. The complementary logic also causes the corresponding alphanumeric data to be visually echoed on display **108/108'** (based on the accumulated encoded representation per the selected operational encoding

scheme, since the last "refresh" of the accumulation buffer), block **208**. Upon echoing, the complementary logic also "clears" the accumulated code inputs.

On the other hand if back at block **206**, it was determined that the operational state is not at such a pause, the complementary logic further determines if alphanumeric data has just been entered through input keypad **102/102'**, block **210**. If it is so determined, and assuming the earlier described "learn mode" is enabled, the complementary logic causes the LEDs of buttons **120** to be lit up accordingly (with a pattern of "dit" and "dah") to visually echo the corresponding codes of the operational encoding scheme of the enteredletters, numbers and punctuations, block **212**.

Back at block **210**, if it was determined that alphanumeric data has not been just entered through input keypad **102/102'**, the complementary logic further determines if alphanumeric data has just been received from another device, e.g. another phone, block **214**. The complementary logic makes the determination by analyzing the received data stream. If so and a vibration device is attached to phone **100/100'**, the complementary logic vibrationally output the received alphanumeric data by causing the vibration device to vibrationally manifest the corresponding encoded representations of the operational encoding scheme of the received alphanumeric data, block **216**.

In each case, upon accumulating an entered encoded representation (block **204**), echoing the corresponding alphanumeric data of the entered encoded representation (block **208**), echoing the encoded representation of entered alphanumeric data (block **212**), or vibrationally output the encoded representation of received alphanumeric data (block **214**), the complementary logic continues operation back at block **202**.

Thus, it can be seen from the above description, a user of phone **100/100'** may advantageously use the encoded data entry facilities provided to enter and send a text message, by entering the variable length encoded representations of the selected operational encoding scheme, during a call, thereby enabling the user to be able to selectively communicate with the caller/callee in a non-verbal or more private manner. The user of phone **100/100'** may also advantageously use the encoded data entry facilities provided to enter address records for an address book inside phone **100/100'**.

Figure 3 illustrates an architecture view of a wireless mobile phone **300**, in accordance with one embodiment. As illustrated, wireless mobile phone **300** includes elements found in conventional mobile client devices, such as micro-controller/processor **302**, digital signal processor (DSP) **304**, non-volatile memory **306**, general purpose input/output (GPIO) interface **308**, transmit/receive (TX/RX) **312** (also known as transceiver), and adapter interface **316**, coupled to each other via bus **314** and disposed on a circuit board **320**. Except for the use of GPIO **308** to also interface code buttons **120**, and the use of non-volatile memory **306** to host complementary logic **330**, the elements are used to perform their conventional functions known in the art. In particular, TX/RX **312** may support one or more of any of the known signaling protocols, including but are not limited to CDMA, TDMA, GSM, and so forth. Their constitutions are known. Accordingly, the elements will not be further described.

Thus, a wireless mobile phone enhanced to enable its user to enter data in an encoded manner, thereby enabling the user to be able to more naturally

communicate a message non-audibly during a call or enter an address record has been described. While the present invention has been described in terms of the above-illustrated embodiments, those skilled in the art will recognize that the invention is not limited to the embodiments described. The present invention can be practiced with modification and alteration within the spirit and scope of the appended claims. Thus, the description is to be regarded as illustrative instead of restrictive on the present invention.